

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO DIFFERENTIAL GEAR TRANSMISSIONS

(71) We, SKF INDUSTRIAL TRADING AND DEVELOPMENT COMPANY B.V., a Company organised and existing under the Laws of the Kingdom of the Netherlands, of Overtoom 141-145, Amsterdam, the Netherlands, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to differential gear transmissions.

The invention provides in or for a differential gear transmission an assembly comprising a crown wheel, supporting means connected to the crown wheel, at least one intermediate gear wheel rotatably mounted on the supporting means, a pair of output gear wheels each of which is in mesh with the intermediate gear wheel and is adapted for connection to an output shaft, and a carrier member, which extends longitudinally between the output gear wheels and through a central bore in each output gear wheel, each output gear wheel having an annular abutment face which engages against a flange on the carrier member to locate the output gear wheel axially in the direction away from the other output gear wheel, such that the output gear wheels are maintained in mesh with the intermediate gear wheel, said supporting means including means for axially locating the intermediate gear wheel in at least one direction such that it is maintained in mesh with the output gear wheels, said intermediate gear wheel being rotatably supported upon an axle of the carrier member, wherein the supporting means comprises at least two brackets inwardly extending from the inner periphery of the crown wheel, each bracket being adapted to provide a bearing surface for the intermediate gear wheel in which surface the axle of the in-

intermediate gear wheel is mounted.

According to a feature of the invention the brackets may be integral with the crown wheel.

According to another feature of the invention each bracket may be provided with a flange which is connected to an inwardly extending flange provided on the crown wheel.

According to a further feature of the invention each bracket may comprise two annular parts each with a flange at its periphery and the two parts being connected together and to the crown wheel at the flanges, and in which each annular part provides part of a seat located inside the flanges, against which seat an end portion of the axle of the intermediate gear wheel seats, said parts further each providing part of an abutment surface facing the carrier member, which abutment surface locates the intermediate gear wheel axially in said one direction.

If this feature is adopted said annular parts may be formed from sheet metal or made of a reinforced synthetic resin or made from a sintered metal powder.

In any of the constructions described in the two last preceding paragraphs in which the carrier member does not provide external bearing surfaces for the output gear wheels, said annular parts may be formed further to provide internal bearing surfaces for the output gear wheels.

Some embodiments of the invention will now be described by way of example and with reference to the accompanying drawings in which:—

Figure 1 is a perspective view of one embodiment of the invention;

Figures 2 to 5 show further embodiments.

The embodiment shown in Figure 1 comprises a crown wheel 1, which is rotatably supported in a transmission hous-

ing (not shown) by means of a single row ball bearing of which the inner race surface 2 is shown. The crown wheel has two integral brackets 3 and 4 directed radially inwardly towards each other. The brackets are each provided with a bearing surface in which the axle 5 of the intermediate gear wheels 6 and 7 is mounted by means of an aperture in the bearing surface of the respective bracket so that the intermediate gear wheels are maintained in mesh with the output gear wheels. Mounted upon the axle 5 is a carrier member 8 which extends longitudinally between the output gear wheels 9 and 10 and through a central bore in each output gear. Each output gear wheel 9 and 10 is located axially in the direction away from the other output gear wheel and maintained in mesh with the intermediate gear wheels 6 and 7 by flanges 11 on the carrier 8, one of which is shown in Figure 1, which engage against annular abutment surfaces on the output gear wheels.

25 In the embodiment shown in Figures 2a and 2b the bracket 23 has a cylindrical bearing surface for the axle 24 and a flange 25 which has two holes 26 for connecting the bracket to the crown wheel.

30 In the embodiment shown in Figures 3a and 3b the bracket also has a flange 27 and holes 28 for connecting it to the crown wheel. In this embodiment the bracket has a cylindrical recess 29 in which the end of an axle of an intermediate wheel is seated.

35 The brackets shown in Figures 2 and 3 can be made from any suitable material, for example a synthetic resin or a sintered metal powder.

40 In the embodiment shown in Figure 4 a support is provided which is made of two parts 30, 31, pressed from sheet metal for instance sheet steel in such a form that the recesses 32, in the two parts, together form a seat for an end portion of the axle 33 of the intermediate wheels. The two parts are also formed with flanges at the edges of the parts which are connected together and to the crown wheel (not shown). A bearing surface 34 is provided adjacent the surface of the bracket facing the carrier member and the intermediate wheel 35 bears axially against the bearing surface.

50 The embodiment shown in Figure 5 is similar to that of Figure 4 except that the parts 36 each have a cylindrical extension 37 which provides an internal bearing surface for a respective output gear wheel 38. The parts which make the supports in the Figure 4 and 5 embodiments are very cheap and simple to manufacture; they may be pressed from sheet metal, made from reinforced synthetic resin or made from light metal. It is also possible to

manufacture the parts from sintered metal powder.

WHAT WE CLAIM IS:—

1. In or for a differential gear transmission an assembly comprising a crown wheel, supporting means connected to the crown wheel, at least one intermediate gear wheel rotatably mounted on the supporting means, a pair of output gear wheels each of which is in mesh with the intermediate gear wheel and is adapted for connection to an output shaft, and a carrier member, which extends longitudinally between the output gear wheels and through a central bore in each output gear wheel, each output gear wheel having an annular abutment face which engages against a flange on the carrier member to locate the output gear wheel axially in the direction away from the other output gear wheel, such that the output gear wheels are maintained in mesh with the intermediate gear wheel, said supporting means including means for axially locating the intermediate gear wheel in at least one direction such that it is maintained in mesh with the output gear wheels, said intermediate gear wheel being rotatably supported upon an axle of the carrier member, wherein the supporting means comprises at least two brackets inwardly extending from the inner periphery of the crown wheel, each bracket being adapted to provide a bearing surface for the intermediate gear wheel in which surface the axle of the intermediate gear wheel is mounted.
2. An assembly as claimed in claim 1, wherein the brackets are integral with the crown wheel.
3. An assembly as claimed in claim 1 or claim 2, wherein each bracket is provided with a flange which is connected to an inwardly extending flange provided on the crown wheel.
4. An assembly as claimed in any of claims 1 to 3 wherein each bracket comprises two annular parts, each with a flange at its periphery and the two parts being connected together and to the crown wheel at the flanges, and in which each annular part provides part of a seat located inside the flanges, against which seat an end portion of the axle of the intermediate gear wheel seats, said parts further each providing part of an abutment surface facing the carrier member, which abutment surface locates the intermediate gear wheel axially in said one direction.
5. An assembly as claimed in claim 4, wherein said annular parts are formed from sheet metal.
6. An assembly as claimed in claim 4, wherein said annular parts are made of reinforced synthetic resin.

7. An assembly as claimed in claim 4, wherein said annular parts are made from a sintered metal powder.

8. An assembly as claimed in any of 5 claims 4 to 7, wherein said annular parts are formed further to provide internal bearing surfaces for the output gear wheels.

9. An assembly as claimed in claim 1 10 and substantially as hereinbefore described

with reference to and as shown in Figure 1 or Figures 2a and 2b or Figures 3a and 3b or Figure 4 or Figure 5 of the accompanying drawings.

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fig-1

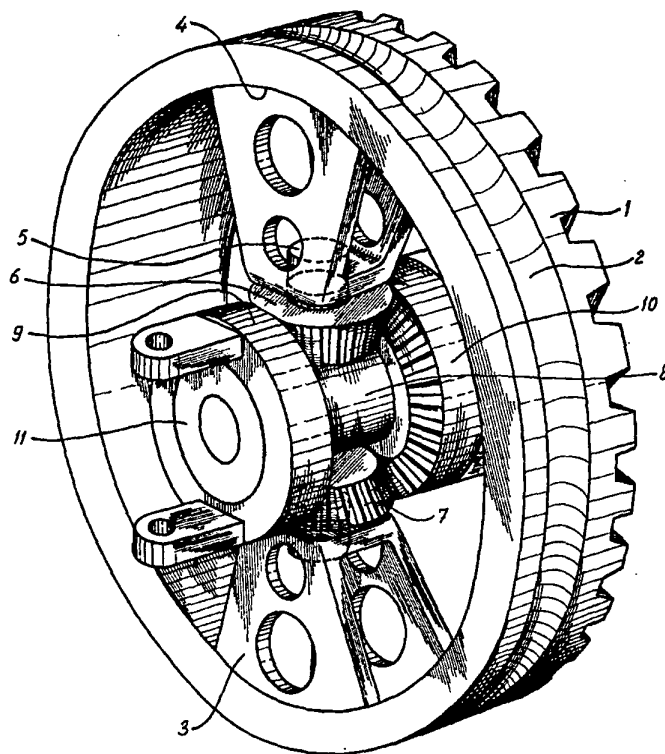


fig-2

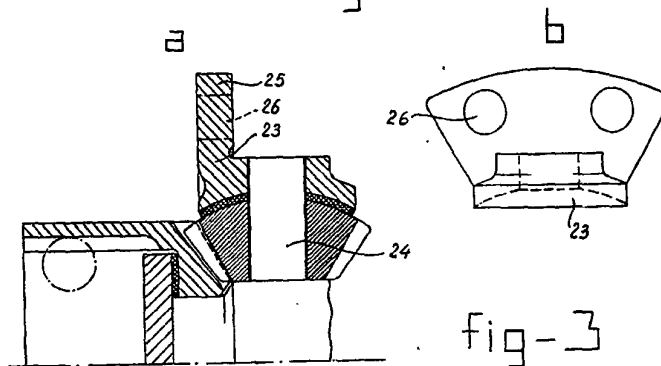


fig-3

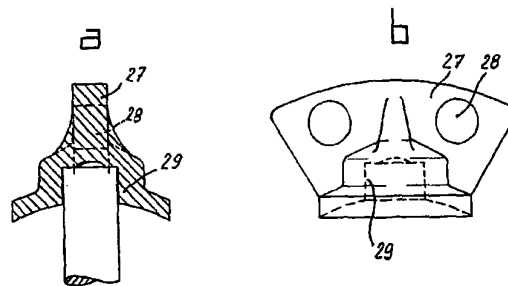


fig-4

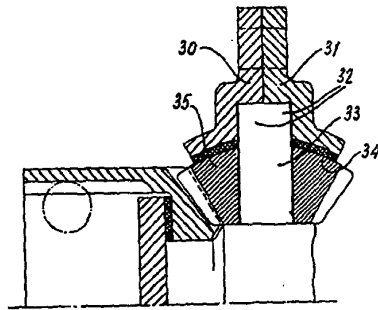


fig-5

